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ABSTRACT

A needs assessment was conducted to determine job tasks relevant for entry-level auto body repairers as a basis for updating the Auto Body Program at Blackhawk Technical Institute (BTI). A survey was mailed to 86 local auto body shops, asking employers to rank 149 tasks in 11 duty areas in terms of importance and frequency performed. Study findings, based on a 37% response rate, revealed the following: (1) entry-level personnel were mainly involved in the repair and refinishing of auto body parts; (2) tasks within the duty areas of "handtools," "painting," "straightening," and "major body parts" accounted for 80% of the tasks rated as most important; (3) tasks related to the repair or replacement of auto components or systems were among the lowest rated; (4) the data confirmed the importance of general education to an auto body curriculum; (5) the single task rated as the most important and most frequently performed was from the duty area, "establish rapport with co-workers and customers." Based on study results, curriculum modifications were recommended with respect to content, sequence, and general education components. A literature review and the questionnaire are included. (LAL)

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A NEEDS ASSESSMENT OF ENTRY-LEVEL COMPETENCIES FOR MODIFICATION OF AN AUTO BODY REPAIR CURRICULUM

by

Robert T. Borremans

Blackhawk Technical Institute

A PRACTICUM PRESENTED TO NOVA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

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ABSTRACT

A NEEDS ASSESSMENT OF ENTRY-LEVEL COMPETENCIES
FOR MODIFICATION OF AN AUTO BODY
REPAIR CURRICULUM

The mission of the Blackhawk Technical Institute (BTI) is to provide occupational training and related services that meet the needs of the people of southcentral Wisconsin. In an effort to assist people prepare to enter the labor market, the institute conducts educational programs that are appropriate to the needs, interests and abilities of students and pertinent to labor market needs of the district. This misison requires that BTI review and update curriculum to ensure that instruction is consistent with employment needs.

This paper reports the findings of a needs assessment conducted to determine job tasks relevant for entry-level auto body repairers. A task analysis was conducted as the data collection or input phase of a systems approach to curriculum development. The results provide an information base used to update the curriculum of the Auto Body Program.

The survey instrument consisted of 149 tasks in eleven duty areas. Employers ranked each task on importance and frequency performed using a five point scale. The eleven duty areas included: Welding and Cutting; Straightening; Fiberglass; Major Body Parts; Glass; Interior; Painting; Mechanical; Electrical; Handtools; and Mathematics, Communications and Human Relations Skills.

The results revealed that entry-level auto body personnel are mainly involved in the repair and replacement of body parts. They prepare

parts for painting but seldom perform finish painting. New auto body workers should know how to properly use handtools, apply filler compounds; and sand, clean and prime surfaces. Beginning personnel seldom troubleshoot, repair or replace mechanical parts, interior components and electrical systems. A curriculum training entry-level auto body personnel should concentrate on developing competence in the use of handtools and preparation of parts for painting before additional, more complex skills are introduced.

The importance of basic academic skills was also confirmed by the results. Mathematics, communications and human relations skills are needed to perform successfully on the job. In fact, "Establish rapport with co-workers and customers" was ranked as the most important and frequently performed task.

The curriculumn of vocational education must be carefully organized to address employment needs as well as individual needs. The study collected data on entry-level tasks which would be used to reorganize and upgrade the curriculum of the Auto Body Program at BTI. A task analysis was conducted which provided information vital to the input phase of a systems approach to curriculum development.

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CHAPTER 1

INTRODUCTION

The mission of the Blackhawk Technical Institute (BTI) is to provide occupational training and related services that meet the needs of the people of southcentral Wisconsin. In an effort to assist people prepare to enter the labor market, the institute conducts educational programs that are appropriate to the needs, interests and abilities of students and pertinent to labor market needs of the district.

When programs are initiated, a comprehensive labor market assessment and task analysis are undertaken. An ad hoc advisory committee is established to advise institute personnel on the need for the prospective program. Local employers are surveyed to determine the need for training in the particular occupational field. If the results of the labor market assessment document the need for training, a task analysis is undertaken to ascertain the specific elements of the curriculum. Throughout this developmental process, the institute reports its findings to the Wisconsin Board of Vocational, Technical and Adult Education (WBVTAE). WBVTAE approval is required before a training program can be offered.

Once a program has been approved for operation by the WBVTAE, a program advisory committee is established. This committee, composed of employers and employees, provides ongoing advice on labor needs within the occupational field. It is the advisory committee that recommends

changes in the curriculum, program structure, equipment and other aspects affecting program operations.

Acquisition of new equipment and minor changes in course content can be implemented based on the recommendations of the advisory committee. However, when the committee suggests a major reorganization of the curriculum, one that results in the addition or deletion of courses, the institute must resurvey the community to determine if the revised curriculum will address occupational needs in the field.

The Auto Body Program at BTI trains students to repair and refinish damaged body parts on automobiles and light trucks. When the institute was organized in 1969, the Auto Body Program was one of the twelve programs offered during that first year. Since that time, the curriculum has been formally reviewed twice; once in 1972 and again in 1979. There has not been a formal examination or substantive changes in the curriculum since 1979.

The program advisory committee has stated that occupational needs had changed and they had suggested that the curriculum be reorganized. They have recommended that a course in electrical component troubleshooting and repair be incorporated and that the unit on drafting be deleted from the curriculum. Instruction in electrical diagram and schematic interpretation, currently a part of the drafting unit, was to become a part of the new electrical course. The committee further suggested that instruction in related academic subjects be reduced in favor of additional shop experience in repair and refinishing techniques.

Statement of Problem

The problem was that labor requirements for auto bodypersonnel within the BTI district had cahnged and it was not known how the changes affected the existing curriculum. Analysis of competencies required by entry-level auto body repair workers had not been conducted in five years.

Statement of Purpose

The purpose of any vocational education program, according to Mager (1967:2), is to prepare a student to be "(1) capable of performing satisfactorily on the job and (2) capable of improving his skill through further practice." As this statement suggests, to be successful, the curriculum of vocational education programs must be carefully organized to address employment and labor needs as well as individual needs.

Planning an effective vocational curriculum requires an information base describing job competencies relevant to the occupational field. The purpose of this research study was to collect data on entry-level tasks which would be used to reorganize and upgrade the curriculum of the Auto Body Program at BTI. A task analysis was conducted which provided information vital to the input phase of a systems analysis approach to curriculum development.

CHAPTER 2

BACKGROUND AND SIGNIFICANCE

Education is a complex process. To be successful, an educational program must be based on the needs that exist within the community to be served. The process of developing curriculum must take into account the diversity of interests and concerns of affected constituency groups. The development process must also be logical and systematic. There are numerous methods which can be utilized to ensure that the curriculum is organized to address identified needs. This study was designed to systematically collect date on requisite competencies needed by entry-level auto body workers within the Blackhawk Vocational, Technical and Adult Education (VTAE) District. The data was collected using accepted needs assessment procedures.

Background

The purpose of instruction is to assist the individual learn something more effectively than he would by himself (Mager, 1967:ix). In this context, for instruction to be effective, the course content or curriculum must be relevant and directed toward the fulfillment of needs. The challenge confronting educators in designing curriculum, according to Hunkins (1980:22), is to ensure that instruction addresses the currently indicated and anticipated future needs of students and society. This is reinforced by Herrscher (1973:17) who said, "the content of each course should be selected on the basis of its relevance to the needs of

the students and its fulfillment of the purposes of the institution." Cook (1981:2) wrote that curriculum planning should reflect the needs of society and be responsive to the ne of students.

While vocational education curriculum is included within the overall framework of education, and the general principles of curriculum design applicable to all educational programs also apply to vocational education, vocational educators have unique responsibilities in determining the relevance of their curriculum. The purpose of vocational education is to prepare people for employment. The success of vocational training is viewed in terms of how well the curriculum assists students to enter and succeed in the workforce (Finch, 1979:13).

For many years, this purpose focused vocational training almost exclusively on occupational skill acquisition. During this period, as Bentley (1977:101) pointed out, it was "assumed that occupational training consisted solely of practice in performing the skill operations of an occupation, and therefore, no special curriculum need be developed or used." Vocational education was principally concerned with labor force expansion and the preparation of youth for entry-level employment. This employment emphasis focused vocational training on the occupational needs and interests of the individual (Kraska, 1982:290).

This approach has changed in recent years. The emphasis is no longer on the individual, although training the individual is still the primary goal of vocational education, but has shifted to fulfillment of business and industry needs. Gleason stated that:

> If the expected outcome of a vocational program is employment (or advancement) of the vocational student, then we must view industry as the target market and the student as the product. It is inherently more sensible to design our curriculum to help students meet the demands of business and industry than to expect companies to adapt their employment policies to meet the needs of vocational graduates (1984:42).

This is where the relevance concerns place additional responsibilities on vocational educators. To be effective, vocational curriculum must respond to individual needs, as related to skills required for job training and work orientation as well as the needs of employers (Kraska, 1982:291). Vocational education must balance the expectations of business and industry, for workers with the knowledge and skills to perform competently on the job, with the needs and interests of the student. Vocational curriculum must do more than just provide practice in manipulative skills needed to perform a job, it must prepare the individual with the combination of skills and knowledge needed to act competently and independently on the job. It must not only develop the physical skills needed for employment by must provide the general knowledge and understanding needed to solve problems and make decisions required on the job (Bentley, 1977:101).

Relevance in vocational education is the degree with which the curriculum is clearly defined and how it meets the needs of its target market (Gleason, 1984:42). If the market for vocational education is business and industry, then it is imperative, indeed essential, to involve employers in the planning of curriculum. As employers of graduates and because of their knowledge of occupational needs and opportunities, business and industry representatives must have an active role in the

selection of vocational education curriculum (Tyler, 1979:65). This broad involvement of employers requires that curriculum decisions be based on meaningful and generalized data (Gleason, 1984:42).

The initial step in curriculum development, once the need for training has been verified, is content determination and selection. This is clearly pointed out by Mager (1967:2) who wrote that in determining vocational education curriculum "it is necessary to know what the job consist of, what one needs to do to perform each of the tasks and how frequently each of the tasks is performed." There are a number of methods or models which can be used by vocational educators to gain an understanding about a job and its requisite tasks. In a generic sense, strategies or procedures for determine curriculum content may be termed needs assessment.

Cook (1981:21) wrote that "needs assessment is perhaps the most important action an educational unit may take in developing a curriculum." English and Kaufman (1980:168) called needs assessment an "empirical process for defining the outcomes of education." It is an identification process used so that expected outcomes can be compared with actual outcomes. It is a process that provides gap statements that may be analyzed and serves as the basis from which to formulate ways to eliminate the gaps (Hunkins, 1980:170). Doll (1982:296) stated that needs assessment is an evaluation process that represents differences between established aims and existing conditions that facilitates the planning of future activities that meet genuine needs.

As such, needs assessment is not a component of the curriculum, but a process of identification and analysis. It is a procedure used by curriculum planners to determine educational needs prior to actually developing a curriculum (Cook, 1980:21). The use of needs assessment as a planning instrument, according to Doll (1982:296), permits determination of curriculum needs in broad, general terms with consideration to several aims. English and Kaufman stated:

> Needs assessment is a process of defining the desired end (or outcome, product or result) of a given sequence of curriculum development. As such it is "curriculumless" process, that is, it is neither a curriculum itself, nor should it embrace any set of assumptions or specifications about the type of curriculum which ought to be developed to reach the ends desired or defined. (1980:168)

English and Kaufman also described the basic assumptions that govern implementation of a needs assessment process. These assumptions include:

1. Reality can be known, understood, and represented in symbolic form.
2. Since reality is dynamic, assessment must be continuous.
3. Perceptual fields can and should be adjusted as we modify our views of educational purposes.
4. Everything can be measured.
5. The aims of education can be made known. (1980:168)

Needs assessment takes many forms usually determined by the educational level or course content being developed. Thompson identified four procedures in content selection which relate to conducting a needs assessment:

1. Judgemental procedure - The curriculum worker identifies the educational and social objectives, determines the conditions under which the objectives are considered desirable and in which they must be realized, and selects the subject matter considered to satisfy the objectives.

2. Experimental procedure - Used to field trial or pilot test curriculum to determine if it satisfies a particular criterion.

3. Analytical procedure - Widely used method involving job analysis to analyze the things people do in order to discover the subject matter content of a particular activity.

4. Consensual procedure - A way of collecting people's (jury of experts) opinions about what they belief the curriculum should be. (1973:158-159)

Other strategies, outlined by Finch, that provide meaningful needs assessment information upon which to make curriculum decisions include:

1. Philosophical basis - Most subjective strategy used mainly to develop curriculum content in academic areas.

2. Introspection - A subjective approach used to examine personal experiences and knowledge, and incorporate these into curriculum content.

3. Function approach - The systematic identification and unification of functions performed across an entire business or industry.

4. Task analysis - Objective data collection resulting in the identification and verification of tasks performed by workers in an occupation. (1979:110)

Development of vocational curriculum can involve any one or a combination of the procedures described. All curriculum planning, according to Hunkins (1980:166), begins with a situational analysis. Situational analysis is an ongoing data collection and monitoring process

seeking to identify needs or changes in needs. It is a very beneficial approach because it gathers information from a number of sources, both within and external to the institution.

Another method that is extremely useful in planning vocational curriculum is the function approach. The function approach seeks to identify curricular content in terms of unifying characteristics across an entire business or industry (Finch, 1979:119). It is a useful technique because of its broad base and the fact that job functions are assessed on an occupational level. By determining job responsibilities across an entire occupational classification, curriculum planners can obtain an overview of the occupation and design curriculum of a general nature that will provide the knowledge and skills applicable to a variety of employment areas.

Job analysis, also referred to as trade analysis, is the determination of job skills by breaking that job into specialized units which can be learned. This detailed examination of job units is the basic criticism of job analysis as an approach that very narrowly identifies only subject matter content (Thompson, 1973:165). Job analysis is very often used with other approaches or in a modified form. For example, occupational analysis employs the techniques of job analysis which are applied on a broader occupational dimension rather than at a job level.

Probably the most widely used type of needs assessment in vocational education is the task analysis. Every job consists of a series of duties and tasks. Duties are broad, large segments of work that involve units of work activity or tasks (Finch, 1979:121). Bortz

(1981:16) defined a task as "a complex unit of cognitive, affective and psychomotor behavior possessing an observable beginning and end, and resulting in a saleable product or service." Task analysis, like job analysis, examines the tasks and duties that comprise a job. Mager (1972:7) defined task analysis as a careful description of what the competent person does or is supposed to do on the job from which instructional outcomes are determined.

As the term task analysis implies, the process involves identification and analysis of job functins to determine which elements are critical to job performance. The first step is to list all tasks that may be included on the job (Mager, 1967:11). This listing of job elements is then verified. This is usually accomplished by job incumbents, but alternative approaches have employers or instructors verify the tasks. The verified tasks, whether information, manipulative, or attitudinal are prioritized and organized into a logical sequence which form the curriculum (Kraska, 1982:291).

The success of a task analysis, or any type of needs assessment intended to determine curricular needs, lies in the procedures used. Collection and analysis of data must be both thorough and systematic (Finch, 1979:122). This is position long held by Tyler who has advocated a systems analysis model or a systems approach to curriculum development. Other have support this approach and the systems analysis model has been modified for a variety of educational uses. Systems such as the Management Information system, the Planning-Programming-Budgeting (PPBS or PPBES), the Input-Output Analysis, and the Program Evaluation and Review Technique (PERT) (Doll, 1982:195) are application based on the

systems approach. For the determination of curriculum, Herrscher (1984) called the systems approach the most effective operational approach to curriculum development. Needs assessment, whether it be a task analysis or some other appropriate model, is the input phase of a systems approach.

Task analysis procedures were used to obtain data needed to make decisions about the Auto Body Program at BTI. The Auto Body Program consisted on 1,120 hours of classroom instruction and practical "hands-on" shop experience. The curriculum was last reviewed and updated in 1979. Since that revision, the curriculum has included units in welding, straightening, painting, handtool use, fiberglassing, glass installation, upholstery and interior repair, mechanical repair, shop procedures and management, estimating, and drafting. Related instruction in human relations, communications and business mathematics are also included in the curriculum (BTI, 1979).

Toboldt stated that auto body designs have changed and, therefore, new repair procedures are necessary (1979:3). Maze (1980) cited the need for changes in tools, repair techniques and materials as justification to change the curriculum used to train auto body repairers. In reviewing the literature on auto body repair, it was noted that there has been little change in the structure of auto body training in the last fifteen years. While certain techniques and procedures have changed, the key components of an auto body curriculum have remained remarkably consistent.

The tasks listed as necessary in the most recent research are similar to research findings in the early 1970s. The tasks listed by D'Armond (1980) as important to a postsecondary auto body repair

curriculum include metalworking and fiberglassing, painting, frame and suspension alignment, glass and trim replacement, estimating, electrical repair, cooling system repair, accessory replacement, mechanical servicing and welding. The auto body curriculum used by the Manitoba Department of Education (1982) contained learning modules in the following eight areas: tool and equipment operation, metallurgy, welding, damage analysis frame alignment, part replacement and repair, refinishing and painting, and shop organization and management. The Radio Corporation of America, a private company training auto body workers, developed a competency based curriculum featuring instruction in trim and accessories, glass, painting and refinishing, metal work, body alignment, frame work and estimating.

Research studies in auto body competencies, conducted in the early 1970s, identified many of the same task areas. Lang (1975) designed an auto body curriculum featuring instruction in welding and cutting, shaping metal, body fillers and fiberglass, body and frame alignment, damage part replacement, basic auto electricity, upholstery and glass, refinishing, and shop management. The auto body curriculum developed by Manuel (1974) to provide entry-level skills included units in body and frame construction, tools, welding, basic metal repair, hardware, glass and trim, major metal repair, refinishing, and damage estimating. Stranke (1975) listed the following duties as important in an auto body curriculum: managing a body shop; refinishing; repairing and patching damage; repairing and maintaining cooling systems; repairing frame damage and front suspension and steering; removing and replacing panels;

repairing and replacing fiberglass panels; maintaining electrical systems and interior trim,; adjusting decks, deck lids, hoods, bumpers and door glass.

The review of the auto body literature showed a number of similarities in key content elements of an auto body curriculum. These duties and tasks were used to design the questionnaire used in this study. While many of the competency areas were similar, important differences were noted. These differences point out the need to assess locally the competencies considered relevant and to incorporate those tasks into the curriculum training auto body workers.

This literature review also described the need to make vocational curriculum relevant to the needs of individuals as well as business and industry. Since business and industry are the target markets for vocational education programs, employers must be involved in content selection. Needs assessment is the important first step in determination of curricular needs. The principles described were applied and a task analysis conducted to obtain data on job tasks needed in the auto body field. The information was used to make decisions regarding the curriculum content of the Auto Body Program at the Blackhawk Technical Institute.

Significance

Student employment needs can only be achieved if the vocational training they participate in is based on relevant occupational competencies. For this reason, along with the fact that business and industry are the markets for the product vocational education develops,

vocational curriculum development efforts must assess and analyze employer opinions of pertinent tasks, and then this information should be used to design course content. This can only be accomplished through a comprehensive assessment of labor needs and analysis of required job competencies. An analysis of tasks is the foundation for making decisions regarding course content (Kraska, 1982:291).

The significance of this study to the Blackhawk Technical Institute was that it provided information on job tasks needed to upgrade and improve the curriculum of the Auto Body Program. A base of information was developed on changing and emerging occupational needs within the auto body repair field which should enable training to focus on those tasks considered to be truly relevant. Principles learned in the Curriculum and Program Planning Seminar were applied in conducting this study. Knowledge on curriculum planning procedures gained in the seminar was used in a practical application that benefited BTI. The outcome was valuable information which should be used to improve the Auto Body Program which should enhance future employment opportunities for program graduates.

CHAPTER 3

PROCEDURES

This research study was initiated to provide data which could be used to make decisions regarding possible revision of the Auto Body Program. This study, a task analysis, was conducted using accepted procedures to obtain information on the tasks performed by beginning auto body workers. BTI staff and the program advisory committee members could use the information to revise and improve the curriculum of the Auto Body Program.

Method

The initial step, as in any task analysis was a listing of all of the tasks believed to comprise a job. For this study, this was accomplished using a variety of resources including: the Auto Body Program Study Guide (1979), the program textbook (Toboldt, 1979), other books on the subject of auto body repair and refinishing (Spicer, 1978; DeRoche, 1981; and du Pont, 1981) used as technical resources for the program, and curriculum documents from similar program in other VTAE institutions in Wisconsin. Other research studies that sought to identify auto body competencies (Maze, 1980; Manitoba Dept. of Educ., 1982; D'Armond, 1980; Radio Corp., 1979; Lang, 1975; Manuel, 1974; and Stranke, 1975) were also examined. This review resulted in a preliminary task list of 230 tasks subdivided into eleven functional duty areas.

A survey questionnaire was then developed using the task listing. To develop a sense of priority for each task, a five point Likert scale was used to rate each task on importance and frequency performed. Mager (1967:2) said that vocational curriculum should be developed based on what a job consists of and the frequency with which tasks are performed. This statement explains why dual measurement scales were used. The importance scale provided a sense of what the job consisted of, while the frequency scale measured how often a task may be performed.

Prior to mailing, the questionnaire was validated by the Auto Body Program advisory committee. This was done to ensure the accuracy of the task statements compared to auto body terminology as well as to identify any missing relevant tasks and other problems that potentially could limit the response rate. Validation was accomplished by administering the questionnaire to advisory committee members and calculating the mean value of responses on each task. Tasks with a mean value of 4.00 or higher on importance were discarded. This peer review resulted in major modifications to the questionnaire. While the number of duty areas remained at eleven, the number of tasks were reduced from 230 to 149. The advisory committee also provided technical terminology which improved the content validity of the instrument. A copy of the survey questionnaire can be found in Appendix A.

Procedures for administering the questionnaire were finalized with the decision to mail the instrument to auto body repair shops within the two county district served by BTI. Three different information sources were used to prepare the mailing list of auto body establishments to receive the questionnaire. One was the Industrial Matrix for the

Blackhawk Vocational, Technical and Adult Education District. This matrix, organized by Standard Industrial Classification (SIC) number, was the most comprehensive listing of local business and industry available. It was based on Wisconsin employment service unemployment compensation records and included all employers, regardless of size, within the Blackhawk VTAE District who contributed to the Wisconsin unemployment insurance system. Permission was obtained from the local offices of the Wisconsin Job Services to utilize this information.

However, because the matrix was based on historical records a second listing of establishments was prepared using telephone directories of communities within the district. Yet a third list was developed using graduate follow-up records. The three lists were compared and merged when the actual mailing list was prepared.

The first mailing of the survey, consisting of a cover letter, questionnaire and return envelope, was sent to 86 establishments. The cover letter requested that the person directly responsible for supervision of auto body personnel complete the questionnaire. Each person completing the questionnaire was asked to rate how important it was for a beginning auto body repairer to know the task, and how frequently the task was performed by an entry level worker. The term "entry-level" was used intentionally to limit responses in an attempt to identify those tasks considered truly essential in a training program designed to prepare new auto body workers. A follow-up mailing was made two weeks later to those who had not returned their completed questionnaire.

Survey responses were tabulated by calculating means and standard deviations for each task on importance and frequency performed. Average

means and standards deviations were also figured by duty areas to gain a understanding about which group of tasks was considered most important and which were most frequently performed by entry-level personnel. The mean values and standard deviations for each of the eleven duty areas was the average for all tasks listed under the duty.

It was originally proposed that correlations would be calculated between frequency and importance on each task using the Spearman Rank Correlation Coefficient. The intended purpose for using the Spearman procedure was to measure rank differences in importance and frequency for each task and then test these differences for significance to see if there was agreement or chance correlation. This procedure was proposed as a method for determining if employers perceive the importance of a task as different from actual performance of the task.

This purpose would have been a misapplication of the Spearman process. Spearman cannot be used on individual items, but on groups of items. Therefore, the methods described in the proposal were modified. Rank difference between tasks were determined arithmetically by subtracting the rank for how frequently the task was performed from the importance rank. A negative difference in rank indicated that the task may not be performed frequently, but was considered relatively high in importance. A positive difference in rank indicated that the competency was ranked low in importance but was performed frequently. The average rank difference for all tasks was calculated to serve as a point of comparison for differences between individual tasks. Tasks with a high mean value on both importance and frequency, and a low rank difference were considered essential to the curriculum.

Assumptions

It was assumed that the population surveyed was homogeneous and represented the full spectrum of establishments employing auto body workers. Another assumption was that employers receiving the questionnaire completed the form in accordance with directions attached to the form. It was assumed that the person completing the form was the employer, in the case of small shops, or the supervisor of auto body personnel, in the case of large dealerships or multi-function establishments. It was assumed that the person who completed the form was knowledgeable about the auto body field and that responses reflected honest perceptions of what entry-level workers need to know and do to perform successfully on the job. It was further assumed that the person who completed the questionnaire would understand the difference between importance and frequency. To help the respondent, importance and frequency were defined on the survey form in terms of the five point measurement scale utilized.

Limitations

The data was collected from auto body establishments within the Blackhawk VTAE District and, therefore, responses express only job requirements within the two county area. The discussion, implications and recommendations are limited to tasks performed by entry-level auto body workers in the district. Limiting responses to entry-level tasks was intentional in order to identify tasks required of new personnel. Responses were also limited by the respondents' knowledge of entry-level

tasks, their understanding of the task statements, and their perception of the concepts of importance and frequency. In order to obtain demographic data on the auto body shops participating in the study, respondents were asked to provide background information about their business. This self-identification may have limited the response rate. The response rate of 37.0 percent, while considered adequate for making decisions about the curriculum, is also a limitation.

Definition of Terms

The following terms were used in the study:

Duty: Large segments of work that involve units of work activity or tasks (Finch, 1979:121).

Entry Level Worker: Someone who is new to or has less than two years experience within an occupational field.

Frequency: How often a particular job task is performed by an entry-level worker.

Importance: The need for an entry-level worker to possess knowledge and skills about a particular job task.

Needs Assessment: The collection and analysis of relevant data which describes instructional needs.

Rank Difference: An arithmetical measurement used to describe the relationship between how important a task is and how frequently it is performed.

Task: A unit of work activity.

Task Analysis: The identification and verification of tasks performed on a job for the purpose of defining occupational training outcomes.

The objective of the study was to conduct a needs assessment of auto body employers to determine relevant job competencies for entry level workers. Task analysis was the most feasible and practical approach for the collection of needed task data. The results of the study supplied information needed to make decisions regarding the future Auto Body Program at BTI. Modification of the curriculum, based on data collected in this study, will enable the program to better meet employment needs as well as the needs of students seeking to enter the auto body repair and refinishing occupational field.

The study was both practical and feasible. BTI is dedicated to offering quality educational programs and every efforts is made to keep instruction current with labor and student needs. The study was a positive effort assuring that this purpose was achieved. Modification of the curriculum, based on the data obtained from this research, should ensure that the Auto Body Program will remain relevant and address identified needs.

CHAPTER 4

RESULTS

An effective vocational education program provides students with the knowledge and skills needed to perform competently on the job. This requires that vocational curriculum be systematically developed and based on identified job requirements. The purpose of this research study was to collect data on entry-level tasks which would be used to reorganize and upgrade the curriculum of the Auto Body Program at BTI. A task analysis was conducted which provided information vital to the input phase of a systems analysis approach to curriculum development.

A total of 86 surveys were mailed to auto body establishments within the Blackhawk VTAE District. Thirty-nine surveys were returned for a return rate of 45.3 percent. However, nine surveys were unusable because of address unknown or returned designated as not applicable because not in the auto body repair business. The adjusted response rate was 39.0 percent.

The size of the shops that responded to the questionnaire, by number of employees, are listed in Table 1. Most of the responding establishments were small, independent operations, employing less than three employees. Almost one quarter (23.3%) of the responding businesses were owner operated shops.

Twenty-eight of the thirty respondents identified the number of years they had been in the auto body repair business. Almost 90 percent had been in business for more than five years, while slightly more than

Table 1

Size of Responding Auto Body Repair Businesses by Number of Employees

Shop Size by Number of Employees	Number	Percent
1 - 2 Employees	12	40.0
3 - 4 Employees	11	36.7
5 - 6 Employees	5	16.7
7 - 8 Employees	1	3.3
9 Employees or More	1	3.3
TOTAL	30	100.0

60 percent reported over 10 years of experience in the auto body repair field. The largest group of respondents, 39.3 percent, had more than twenty years of experience. The years of experience for respondents is reported in Table 2.

Table 2

Years of Experience of Responding Auto Body Repair Businesses

Years of Experience	Number	Percent
0 to 5 years	3	10.7
6 to 10 years	8	28.6
11 to 15 years	3	10.7
16 to 20 years	3	10.7
More than 20 years	11	39.3
TOTAL	28	100.0

Means and standard deviations were calculated for each task. The tasks were then ranked on both importance and frequency, using the calculated mean with rankings adjusted for the tasks with identical means. The ranking of all 149 tasks by importance and frequency, along with the mean for each task, are contained in Appendices B and C.

The sixteen most important tasks for beginning auto body workers are shown in Table 3 (Page 26). Nine of the sixteen highest rated items involve painting competencies, while an additional four tasks are straightening skills. Taken together, thirteen of the sixteen most important tasks (81.3%) are skills used directly in the repair and refinishing of body parts. Interestingly, the top rated item was not an auto body repair competency but a human relations skill.

The most frequently performed task and three of the nine most performed tasks were general education (human relations and communications) skills. Ten of the eighteen most performed tasks involve skills used in repair and refinishing duties. The eighteen most frequently performed tasks are listed in Table 4 (Page 27).

More than half of the seventeen least important tasks were in the electrical duty area. Four tasks involved in the repair of passenger compartment components were also listed among the least important tasks. Table 5 (Page 28) lists the seventeen least important tasks for beginning auto body workers.

Electrical tasks were also listed among the least performed tasks. Five of the fifteen least frequently performed tasks were electrical. Four tasks involved in the repair of components in the

Table 3

Fifteen Most Important Tasks for
Entry-Level Auto Body Workers*

Rank	Item No.	Item	Mean
1	11.10	Establish rapport with co-workers and customers	1.38
2	7.5	Use proper metal conditioning methods	1.57
3	7.4	Perform proper clean-up before painting	1.60
4.5	7.6	Properly prime prepared surfaces	1.62
4.5	2.1	Straighten fenders, doors, quarter and rocker panels	1.62
7	7.15	Apply acrylic lacquer paint	1.67
7	10.9	Select and use proper impact wrenches	1.67
7	7.9	Properly operate a spray gun in paint application processes	1.67
9	7.8	Mask area in preparation for painting	1.68
10.5	2.19	Use power sanding tools and equipment	1.70
10.5	7.1	Prepare surface for paint using a DA type sander	1.70
12.5	2.2	Straighten hoods, trunk lids and roofs	1.72
12.5	7.10	Clean and care for spray gun	1.72
14	2.18	Use hand sanding tools	1.73
15.5	7.3	Choose and apply proper abrasives for finishing operations	1.76
15.5	11.8	Use correct grammar when speaking and writing	1.76

* 16 tasks are actually listed because of tied rankings

Table 4

Fifteen Most Frequently Performed Tasks
for Entry-Level Auto Body Workers*

Rank	Item No.	Item	Mean
1	11.10	Establish rapport with co-workers and customers	1.33
2	7.8	Mask area in preparation for painting	1.60
3	11.8	Use correct grammar when speaking and writing	1.63
4.5	7.6	Properly prime prepared surfaces	1.67
4.5	2.19	Use power sanding tools and equipment	1.67
7.5	11.9	Demonstrate effective telephone communication	1.70
7.5	7.3	Choose and apply proper abrasives for finishing operations	1.70
7.5	7.4	Perform proper clean-up before painting	1.70
7.5	7.24	Apply rubbing compounds	1.70
10	10.8	Select and use hand wrenches	1.71
11	7.5	Use proper metal conditioning methods	1.73
12	7.1	Prepare surface for paint using a DA type sander	1.74
13	10.1	Select and use body hammers	1.77
15.5	2.18	Use hand sanding tools	1.80
15.5	2.17	Use hand forming tools	1.80
15.5	7.9	Properly operate a spray gun in paint application processes	1.80
15.5	10.9	Select and use proper impact wrenches	1.80

* 18 tasks are actually listed because of tied rankings

Table 5

Fifteen Least Important Tasks for
Entry-Level Auto Body Workers*

Rank	Item No.	Item	Mean
134.5	2.13	Solder using tin-lead mixture	3.57
134.5	6.5	Remove and install sunroof panels	3.57
134.5	9.19	Service and replace power seats	3.57
134.5	9.4	Identify socket design	3.57
137.5	9.16	Service and replace radio	3.60
137.5	9.10	Service and replace fiber optics	3.60
139.5	9.15	Service and replace cruise control	3.62
139.5	9.13	Service and replace air conditioner electrical components	3.62
141	9.8	Service and replace electrical motors	3.63
142	6.9	Repair or replace carpeting	3.68
143	9.14	Service and replace electric operated sunroof	3.73
144	9.20	Service and replace seat-belt starter interlock system	3.75
145.5	8.1	Repair or replace engine	3.93
145.5	8.2	Repair or replace oil pan and pumps	3.93
147	6.7	Repair fabric upholstery	3.96
148	1.3	Weld aluminum	4.00
149	6.8	Repair vinyl upholstery	4.14

* 17 tasks are actually listed because of tied rankings

passenger compartment were among the least performed, with the repair of fabric upholstery and vinyl upholstery being the two lowest rated tasks. The tasks least frequently performed by entry-level auto body personnel are shown in Table 6 (Page 30).

The most important duty area was "Handtools." Handtool use was considered most important by a comfortable margin over "Painting" which was listed second. Repair of electrical components was the least important duty. These was a substantial difference, almost half of a point, between the three lowest rated duties and the other duties. The rank of the eleven duty areas are ranked by importance in Table 7 (Page 31).

The rank of duties in order of frequency performed are listed in Table 8 (Page 32). "Handtools" was the most frequently performed duty for beginning auto body workers. There was a wide margin of difference between "Handtools" and "Painting," the second ranked duty area. These was also a large spread between the three least frequently performed duties and the other duty areas. "Electrical" was the lowest ranked duty, followed by "Mechanical" and "Interior", which is the same order they ranked in importance.

Table 6

The Fifteen Least Frequently Performed Tasks
for Entry-Level Auto Body Workers

Rank	Item No.	Item	Mean
135	9.13	Service and replace air conditioner electrical components	4.03
136.5	7.19	Apply synthetic enamel paint	4.07
136.5	9.18	Service and replace rear window defogger	4.07
138	9.19	Service and replace power seats	4.10
139	6.9	Repair or replace carpeting	4.13
140	8.11	Repair or replace timing gear and covers	4.17
141	8.2	Repair or replace oil pan and pumps	4.20
142.5	7.18	Apply water base acrylic paint	4.23
142.5	8.1	Repair or replace engine	4.23
144	6.5	Remove and install sunroof panels	4.24
145.5	9.20	Service and replace seat-belt starter interlock system	4.30
145.5	9.14	Service and replace electric operated sunroof	4.30
147	1.3	Weld aluminum	4.40
148	6.7	Repair fabric upholstery	4.50
149	6.8	Repair vinyl upholstery	4.59

Table 7

Ranking of Duty Areas
by Importance

Rank	Item No.	Item	Mean*
1	10.0	Handtools	2.06
2	7.0	Painting	2.19
3	2.0	Straightening	2.22
4	4.0	Major Body Parts	2.25
5	11.0	Mathematics, Communications and Human Relations	2.37
6	5.0	Glass	2.60
7	3.0	Fiberglass	2.67
8	1.0	Welding and Cutting	2.75
9	6.0	Interior	3.23
10	8.0	Mechanical	3.29
11	9.0	Electrical	3.40

* Based on the average means of tasks comprising the duty

Table 8

Ranking of Duty Areas by
Frequency Performed

Rank	Item No.	Item	Mean*
1	10.0	Handtools	2.14
2	7.0	Painting	2.47
3	2.0	Straightening	2.51
4.5	4.0	Major Body Parts	2.56
4.5	11.0	Mathematics, Communications and Human Relations	2.56
6	1.0	Welding and Cutting	2.98
7	3.0	Fiberglass	3.10
8	5.0	Glass	3.15
9	6.0	Interior	3.71
10	8.0	Mechanical	3.79
11	9.0	Electrical	3.81

* Based on the average means of tasks comprising the duty

A review of the competencies reveals tasks which show a difference in rank between importance and frequency. To describe this difference, the average rank difference for all tasks was calculated to serve as a point of comparison of differences between individual tasks. The rank difference is the amount of agreement between the importance and frequency mean ratings. The lower the rank difference the more agreement there is between the importance of knowing how to do a task and how often it is performed by entry-level personnel. Tasks with a high mean value on both importance and frequency, and a low rank difference are considered most critical to the curriculum.

The average rank difference for the 149 tasks was 16.78. Based on the average, it was determined that a difference in rank of five of less, or thirty or more was considered significant. The tasks with a rank difference of five or less in order of importance, as determined by mean values on the importance scale, are listed in Table 9. The rank differences of all tasks in order of importance are shown in Appendix D.

Five of the sixteen items (31.3%) considered most important (Table 3) had a rank difference of 5 or less. The average rank difference for the sixteen most important tasks was 8.16 compared to 16.78 for all tasks. Five of the seventeen tasks performed most often (Table 4), or 29.4 percent, had a rank difference of 5 or less. The average difference for the most frequently performed tasks was 9.65. On the other end of the scale, a much higher number of tasks rated as least important and least performed had a mean differences of 5 or less. Eleven of the seventeen (64.7%) of the least important tasks (Table 6) and ten of the fifteen (66.7%) least frequently performed tasks had rank differences

Table 9

Entry-Level Auto Body Tasks Showing a Difference in Rank of 5 or Less

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
7.4	Perform proper clean-up before painting	3.	7.5	- 4.5
7.14	Use air brush	126.5	130	- 3.5
9.19	Service and replace power seats	134.5	138	- 3.5
9.14	Service and replace electric operated sunroof	143	145.5	- 2.5
7.1	Prepare surface for paint using a DA type sander	10.5	12	- 1.5
2.18	Use hand sanding tools	14	15.5	- 1.5
9.17	Service and replace power antenna	105.5	107	- 1.5
8.15	Mount and balance tires	109.5	108	- 1.5
8.8	Repair or replace brakes	114.5	116	- 1.5
9.20	Service and replace seat-belt starter interlock system	144	145.5	- 1.5
8.12	Repair or replace exhaust system	125	126	- 1
6.7	Repair fabric upholstery	147	148	- 1
2.14	Properly mix plastic fillers	18.5	19	- 0.5
2.15	Properly apply plastic fillers to damaged areas	18.5	19	- 0.5
7.13	Clean and care for spray booth	74.5	75	- 0.5
11.10	Establish rapport with co-workers and customers	1	1	0

Table 9 (Continued)

Entry-Level Auto Body Tasks Showing a Difference in Rank of 5 or Less

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
7.6	Properly prime prepared surfaces	4.5	4.5	0
2.5	Set-up and use stationary rack type of frame straightening equipment	56	56	0
6.8	Repair vinyl upholstery	149	149	0
4.6	Replace and install door lock	84.5	84	+ 0.5
9.1	Apply electron theory - Ohm's Law	123	122.5	+ 0.5
8.7	Replace harmonic balancer	132	131.5	+ 0.5
8.3	Replace water pump	120	119	+ 1
1.3	Weld aluminum	148	147	+ 1
11.11	Read and interpret service manuals	33.5	32	+ 1.5
9.12	Service and replace instrument panel lights and gauges	124	122.5	+ 1.5
8.4	Replace engine mount	114.5	112	+ 2.5
2.16	Properly shape plastic fillers to contour of the area being repaired	22	19	+ 3
6.9	Repair or replace carpeting	142	139	+ 3
8.1	Repair or replace engine	145.5	142.5	+ 3
10.3	Select and use spoons	39.5	36	+ 3.5
7.7	Choose and use surface sealers	29.5	25.5	+ 4

Table 9 (Continued)

Entry-Level Auto Body Tasks Showing a Difference in Rank of 5 or Less

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
2.8	Set-up and use porta-power	51	47	+ 4
9.13	Service and replace air conditioner electrical components	139.5	135	+ 4.5
8.2	Repair or replace oil pan and pumps	145.5	141	+ 4.5
6.6	Replace and install seats and seat tracks	111	106	+ 5
9.3	Identify component functions	121	116	+ 5

of five or less. The average rank difference for tasks considered least important was 7.21, and 6.57 for tasks performed least often. The low rank difference in these items shows general agreement about the tasks considered most important and most frequently performed, and those which are least important and performed least often.

There is consensus on the most important and most frequently performed tasks. "Establish rapport with co-workers and customers" was rated first on both importance and frequency performed. There is also agreement on "Repair vinyl upholstery" as the task least important and least frequently performed. In fact, there is concurrence on the three

least important and performed tasks. "Repair vinyl upholstery," "Weld aluminum," and "Repair fabric upholstery" were the three lowest ranked tasks on both the importance and frequency scales.

Tasks which show a difference in rank of 30 or more are listed in Table 10. A negative difference in rank indicates that the task may not be performed frequently, but is consider relatively important. A positive difference in rank indicates that the competency is ranked low in importance but is performed frequently. A comparison of importance and frequency ranks for all tasks is contained in Appendix D.

Table 10

Entry-Level Auto Body Tasks Showing a Difference in Rank of 30 or More

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
1.10	Shrink sheet metal using heat	26	80	-54
5.1	Check opening dimensions and measurements	43.5	91.5	-48
7.20	Apply clear coat paint system	29.5	75	-45.5
2.11	Straighten a unitized body using a dedicated bench type system	71.5	113	-41.5
2.9	Determine the type of frame damage	37	77	-40
2.12	Straighten a unitized body using a universal type system	55	93.5	-38.5
7.23	Apply vinyl lower body stone protection	45	82	-37
5.7	Adjust glass for wind noise and leaks	58.5	95.5	-37
4.3	Replace door skin	43.5	80	-36.5
5.8	Check for leaks	58.5	93.5	-35
4.7	Replace and align tailgates	66	101	-35
11.6	Perform simple angular (degrees) measurement	63.5	98.5	-35
6.2	Remove and replace dash and components	74.5	109	-34.5
6.4	Replace headliners	102.5	133.5	-31
3.2	Prepare resin and fiberglass filler material	70	100	-30

Table 10 (Continued)

Entry-Level Auto Body Tasks Showing a Difference in Rank of 30 or More

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
11.7	Perform simple geometry as applied to measurement	98	68	+30
6.3	Remove and install interior molding	84.5	52.5	+32
11.2	Perform mental arithmetic to verify validity of calculator resolved problems	81.5	48	+33.5
9.9	Service and replace exterior and accessory lights and switches	95.5	58.5	+37
9.6	Perform operational inspection	99.5	62	+37.5
9.11	Service and replace horns and buzzer warning systems	117	70	+47
8.6	Replace or adjust belts	108	61	+47
7.27	Apply soundproofing	101	52.5	+48.5
11.3	Interchange ratios, fractions, proportions, and decimals	109.5	60	+49.5
11.4	Calculate percentages	105.5	52.5	+53
1.6	Cut metal with an abrasive wheel	105.5	49	+56.5
2.4	Straighten bumpers	128.5	72	+56.5
1.7	Use a power jigsaw to cut metal	130.5	66	+64.5

Seventy-three tasks had a positive rank difference which indicates that task was performed fairly frequently but the ability to performed the task is relatively unimportant. A negative rank difference was recorded for seventy-two tasks. Four of the competencies had no difference between importance and frequency ranks. Rank correlations were completed between task responses using Spearman's Rank Order Correlation Coefficient. Adjustments were made for tied ranks. The correlation between importance and frequency was .8444. This correlation was significant at the .01 level which indicated a high degree of agreement between responses.

CHAPTER 5

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

The purpose of this study was to conduct a needs assessment of auto body employers to determine job tasks relevant for entry-level workers. The results of this research provided information necessary to make decisions regarding the curriculum of the Auto Body Program at BTI. Modification of the curriculum based on data collected through this study should enable the program to better meet auto body employment needs within the two county area in southcentral Wisconsin served by BTI.

Discussion

The data yielded several important facts about job tasks required of entry-level auto body workers. Probably the most significant was that entry-level personnel are mainly involved in the repair and refinishing of auto body parts. Seldom do they work on other auto components or systems (i.e. mechanical or electrical systems). This distinction was very clear on both the importance and frequency performed level.

There were four duty areas that contained tasks mainly involved in the repair and refinishing of body parts. These duty areas were: "Handtools," "Painting," "Straightening," and "Major Body Parts." Tasks within these four duty areas accounted for twenty-four of the thirty most important tasks, or eighty percent. On the frequency performed questions, tasks in these duty areas recorded an even higher number of

the total. Twenty-seven, or 90 percent, of the thirty most frequently performed tasks were in auto body repair and refinishing duties.

Conversely, tasks related to the repair or replacement of auto components or systems were among the lowest rated. The "Electrical," "Mechanical," and "Interior" duty areas contained tasks involved in the repair and replacement of components and systems. Twenty-four of the thirty least important tasks were in one of these three duty areas. This represented eighty percent of the lowest rated tasks. Of the thirty least frequently performed tasks, twenty-five, or 83.3 percent, were from one of these three areas.

The need to develop skills in auto body repair and refinishing were also clearly evident when the tasks were grouped into duty areas. Based on the average mean for tasks within each duty area, "Handtools," "Painting," "Straightening" and "Major Body Parts" were ranked first through fourth respectively in both importance and frequency performed.

It is worth noting that when taken individually, twelve (40.0%) of the thirty most important tasks and twelve of the thirty most frequently performed tasks, were in the "Painting" duty area. Yet, when tasks were grouped by duty area, "Handtools" was ranked first in both importance and frequency. In reviewing the "Painting" tasks, it was evident that competencies involved in the repair and preparation of the surface (i.e. conditioning metal, clean and prime surface, etc.) and clean-up after painting were the most important and frequently performed tasks for entry-level workers. Finishing and painting were tasks usually performed by more experienced workers. This distinction of "Painting"

responsibilities had the effect of lowering the overall rank. While "Handtools" are relatively unimportant on an individual task basis, entry level workers must possess skills in the proper use of handtools before they can perform other basic "Painting" tasks. Respondents apparently assumed that entry-level workers would be competent with handtools, which lowered the ranking of individual items.

The importance of general education to an auto body curriculum was confirmed by the data. "Mathematics, Communications and Human Relations" was the fifth ranked duty area, ahead of other duties traditionally considered important to auto body work, such as welding and cutting metal, replacing glass, and repairing mechanical and electrical parts. In fact, "Establish rapport with co-workers and customers," the single task rated as the most important and most frequently performed, was from this duty area. It was concluded that mathematics, communications and human relations were important competencies for entry-level auto body workers.

One of the reasons this study was conducted was because of a suggestion by the advisory committee that a unit in the repair and replacement of electrical components be incorporated into the auto body curriculum. Yet, in both importance and frequency performed, "Electrical" was the lowest ranked duty area. Of the thirty least important tasks, eleven (36.7%) were "electrical" tasks. Thirteen, or 43.3 percent, of the thirty tasks least often performed by entry-level personnel were "electrical."

Implications

This study was designed to collect information that could be used to make decisions about the structure of the Auto Body Program curriculum. The program advisory committee had recommended that the curriculum be reorganized because of changing occupational needs. They suggested that a course in troubleshooting and repair of electrical components be added and that the unit in drafting be deleted. They further recommended that instructional time in related academic subjects be reduced in favor of additional shop experience in repair and refinishing techniques. Findings from this study have implications on the existing curriculum as well as on the modifications proposed by the advisory committee.

It is obvious from the data that techniques and processes in the repair and refinishing of auto body parts compose the major tasks performed by entry-level workers. However, beginning auto body personnel usually assist more experienced auto body workers remove damaged parts and install new or repaired parts. They are involved in preparation of the part and seldom perform finish painting. There is general agreement that entry-level workers must know how to properly use handtools; apply plastic filler compounds; and sand, clean and prime surfaces. New personnel also are involved in clean-up tasks. Beginning auto body workers start with basic repair, installation, preparation and clean-up tasks and only move on to more difficult assignments once they have gained sufficient experience and demonstrated competence in the basic duty areas. The curriculum should reflect this emphasis and training

should concentrate on tasks relevant to the use of handtools and preparation of the surface for painting. Once the student has demonstrated competency in these tasks, additional skills in painting should be introduced.

Benavidez stated that basic skills are an integral part of occupational duties and tasks, and, since students are motivated to learn job skills, relating basic skills to job requirements adds meaning and purpose to academic subject instruction (1983:14). Basic academic subjects are important and instruction should focus on practical applications of academic skills. Knowledge and skill in mathematics; communications skills, both oral and written; listening; and human and job relations are needed to perform successfully on the job. Instructional time devoted to academic subjects should not be reduced. If additional experience is needed in repair and refinishing techniques, it should not be accomplished at the expense of of reducing time devoted to academic subjects.

Curriculum documents from another VTAE district and three of the six studies (D'Armond, 1980; Lang, 1975; and Stranke, 1975) reviewed in the literature search contained instructional units on electricity or the repair of electrical components. Despite the fact that electrical repair has been incorporated into the auto body curriculum in other areas, the findings of this study do not support the need for an instructional unit in electrical components. Entry-level personnel spend little time troubleshooting or repairing electrical parts. While drafting skills appear to be unnecessary, based on a review of the

literature and auto body curriculum documents from other schools, there is no evidence which would suggest a need to replace drafting with a course in electrical repair. There was little evidence to support even an introductory course in basic electricity or schematic reading, although such a course might be beneficial for future career development.

Based on the findings instruction in mechanical troubleshooting and repair seems unnecessary. Except for the replacement of door trim panels, there was little need for training in the repair and replacement of interior passenger compartments components. Reorganization of the curriculum, to accommodate more training time in repair and refinishing techniques, could be accomplished by eliminating or, at the very least, reducing time devoted to mechanical and interior compartment repairs.

Recommendations

On the basis of the findings of this study, the following recommendations are made:

1. That the Auto Body Program advisory committee accept this study, review the findings, and use the results to guide their efforts in reorganizing the curriculum.

2. That the Auto Body Program curriculum focus on developing skills needed in the repair and refinishing of body parts, particular in the use of handtools and body preparation tasks.

3. That the students demonstrate competency in the use of handtools and body preparation tasks before proceeding with more complex repair and refinishing tasks.

4. That the present course in drafting be discontinued.

5. That the proposed course in electrical component troubleshooting and repair not be incorporated into the curriculum.

6. That a stronger relationship be developed between the auto body curriculum and basic academic subjects particularly in human relations and communications skills.

On the basis of the findings of this study, the Auto Body Program can be reorganized to meet occupational needs within the two county area served by BTI. The outcome will be a curriculum which addresses the needs of employers while providing instruction that will enhance student employability within the auto body repair field.

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APPENDIX A

AUTO BODY CURRICULUM CONTENT QUESTIONNAIRE

AUTO BODY
CURRICULUM CONTENT SURVEY

Name:_____

Company Name:_____

Address:_____

City:_____ State:_____ Zip Code:_____

Telephone Number: Area Code:(_____) _____ - _____

Number of years in business:_____

Number of auto body workers employed at your business:_____

Please complete this questionnaire by circling the number that tells how important and how often a job task is performed by an entry-level worker. The following definitions are to be used in answering the questions:

Frequency - How often is a task performed on the job by an entry level worker.

1 = Daily - Performed every day
2 = Weekly - Performed at least once a week but less than daily
3 = Monthly - Performed at least once a month but less than weekly
4 = Less than monthly - Performed less than once a month (bi-monthly, quarterly, etc.)
5 = Never - Not performed

Importance - The need for an entry level worker to possess the skill.

A = Critical - The skill is critical or essential
B = Very Important - The skill is very important
C = Important - The skill is important
D = Some - The skill is of some importance
E = Little - The skill is of little importance

Please circle the number that corresponds to how often (frequency) an entry-level worker performs the listed job task. Also, circle the number that corresponds to how important it is for an entry-level worker to have this skill.

No.	Item	Frequency	Importance
1.0	**WELDING AND CUTTING**		
1.1	Set-up and use oxyacetylene equipment to cut, braze and weld	1 2 3 4 5	A B C D E
1.2	Set-up and use arc and resistance welding equipment	1 2 3 4 5	A B C D E
1.3	Weld aluminum	1 2 3 4 5	A B C D E
1.4	Weld using MIG method	1 2 3 4 5	A B C D E
1.5	Perform plastic welding	1 2 3 4 5	A B C D E
1.6	Cut metal with an abrasive wheel	1 2 3 4 5	A B C D E
1.7	Use a power jigsaw to cut metal	1 2 3 4 5	A B C D E
1.8	Use a shears to cut metal	1 2 3 4 5	A B C D E
1.9	Cut metal using an impact hammer	1 2 3 4 5	A B C D E
1.10	Shrink sheet metal using heat	1 2 3 4 5	A B C D E
1.11	Other:_____	1 2 3 4 5	A B C D E
2.0	**STRAIGHTENING**		
2.1	Straighten fenders, doors, quarter and rocker panels	1 2 3 4 5	A B C D E
2.2	Straighten hoods, trunk lids and roofs	1 2 3 4 5	A B C D E
2.3	Know how to position and use pull rods	1 2 3 4 5	A B C D E
2.4	Straighten bumpers	1 2 3 4 5	A B C D E
2.5	Set-up and use stationary rack type of frame straightening equipment	1 2 3 4 5	A B C D E
2.6	Set-up and use portable (dozer) type of frame straightening equipment	1 2 3 4 5	A B C D E
2.7	Set-up and use rail or floor type of frame straightening equipment	1 2 3 4 5	A B C D E
2.8	Set-up and use porta-power	1 2 3 4 5	A B C D E
2.9	Determine the type of frame damage	1 2 3 4 5	A B C D E
2.10	Use a frame gauge	1 2 3 4 5	A B C D E

No.	Item	Frequency	Importance
2.11	Straighten a unitized body using a dedicated bench type system	1 2 3 4 5	A B C D E
2.12	Straighten a unitized body using a universal type system	1 2 3 4 5	A B C D E
2.13	Solder using tin-lead mixture	1 2 3 4 5	A B C D E
2.14	Properly mix plastic fillers	1 2 3 4 5	A B C D E
2.15	Properly apply plastic fillers to damaged areas	1 2 3 4 5	A B C D E
2.16	Properly shape plastic fillers to contour of the area being repaired	1 2 3 4 5	A B C D E
2.17	Use hand forming tools	1 2 3 4 5	A B C D E
2.18	Use hand sanding tools	1 2 3 4 5	A B C D E
2.19	Use power sanding tools and equipment	1 2 3 4 5	A B C D E
2.20	Other:_____	1 2 3 4 5	A B C D E
3.0	**FIBERGLASS**		
3.1	Repair damaged fiberglass panel	1 2 3 4 5	A B C D E
3.2	Prepare resin and fiberglass filler material	1 2 3 4 5	A B C D E
3.3	Reinforce fiberglass components	1 2 3 4 5	A B C D E
3.4	Join and patch fiberglass	1 2 3 4 5	A B C D E
3.5	Fill and finish fiberglass repairs	1 2 3 4 5	A B C D E
3.6	Other:_____	1 2 3 4 5	A B C D E
4.0	**MAJOR BODY PARTS**		
4.1	Repair and replace body sheet metal components	1 2 3 4 5	A B C D E
4.2	Align and adjust body sheet metal	1 2 3 4 5	A B C D E
4.3	Replace door skin	1 2 3 4 5	A B C D E
4.4	Align and adjust door hinges and strikers	1 2 3 4 5	A B C D E
4.5	Repair or replace outside door handle	1 2 3 4 5	A B C D E

No.	Item	Frequency	Importance
4.6	Replace and install door lock	1 2 3 4 5	A B C D E
4.7	Replace and align tailgates	1 2 3 4 5	A B C D E
4.8	Replace and install trim	1 2 3 4 5	A B C D E
4.9	Replace and install weatherstripping	1 2 3 4 5	A B C D E
4.10	Other:_____	1 2 3 4 5	A B C D E
5.0	GLASS		
5.1	Check opening dimensions and measurements	1 2 3 4 5	A B C D E
5.2	Replace windshield using rubber set	1 2 3 4 5	A B C D E
5.3	Replace windshield using bonded system	1 2 3 4 5	A B C D E
5.4	Replace windshield using butyl tape	1 2 3 4 5	A B C D E
5.5	Remove and install stationary glass	1 2 3 4 5	A B C D E
5.6	Remove and install operative glass	1 2 3 4 5	A B C D E
5.7	Adjust glass for wind noise and leaks	1 2 3 4 5	A B C D E
5.8	Check for leaks	1 2 3 4 5	A B C D E
5.9	Other:_____	1 2 3 4 5	A B C D E
6.0	INTERIOR		
6.1	Remove and replace door trim panels	1 2 3 4 5	A B C D E
6.2	Remove and replace dash and components	1 2 3 4 5	A B C D E
6.3	Remove and install interior molding	1 2 3 4 5	A B C D E
6.4	Replace headliners	1 2 3 4 5	A B C D E
6.5	Remove and install sunroof panels	1 2 3 4 5	A B C D E
6.6	Replace and install seats and seat tracks	1 2 3 4 5	A B C D E
6.7	Repair fabric upholstery	1 2 3 4 5	A B C D E
6.8	Repair vinyl upholstery	1 2 3 4 5	A B C D E
6.9	Repair or replace carpeting	1 2 3 4 5	A B C D E
6.10	Clean interior	1 2 3 4 5	A B C D E

No.	Item	Frequency	Importance
7.0	PAINTING		
7.1	Prepare surface for paint using a DA type sander	1 2 3 4 5	A B C D E
7.2	Prepare surface for paint using an oscillating sander	1 2 3 4 5	A B C D E
7.3	Choose and apply proper abrasives for finishing operations	1 2 3 4 5	A B C D E
7.4	Perform proper clean-up before painting	1 2 3 4 5	A B C D E
7.5	Use proper metal conditioning methods	1 2 3 4 5	A B C D E
7.6	Properly prime prepared surfaces	1 2 3 4 5	A B C D E
7.7	Choose and use surface sealers	1 2 3 4 5	A B C D E
7.8	Mask area in preparation for painting	1 2 3 4 5	A B C D E
7.9	Properly operate a spray gun in paint application processes	1 2 3 4 5	A B C D E
7.10	Clean and care for spray gun	1 2 3 4 5	A B C D E
7.11	Maintain operating condition of air compressor	1 2 3 4 5	A B C D E
7.12	Clean and care for air regulator	1 2 3 4 5	A B C D E
7.13	Clean and care for spray booth	1 2 3 4 5	A B C D E
7.14	Use air brush	1 2 3 4 5	A B C D E
7.15	Apply acrylic lacquer paint	1 2 3 4 5	A B C D E
7.16	Apply acrylic enamel paint	1 2 3 4 5	A B C D E
7.17	Apply urethane enamel paint	1 2 3 4 5	A B C D E
7.18	Apply water base acrylic paint	1 2 3 4 5	A B C D E
7.19	Apply synthetic enamel paint	1 2 3 4 5	A B C D E
7.20	Apply clear coat paint system	1 2 3 4 5	A B C D E
7.21	Replace wood grain transfer	1 2 3 4 5	A B C D E
7.22	Apply striping tape	1 2 3 4 5	A B C D E
7.23	Apply vinyl lower body stone protection	1 2 3 4 5	A B C D E

No.	Item	Frequency	Importance
7.24	Apply rubbing compounds	1 2 3 4 5	A B C D E
7.25	Apply polish and wax	1 2 3 4 5	A B C D E
7.26	Apply rustproofing	1 2 3 4 5	A B C D E
7.27	Apply soundproofing	1 2 3 4 5	A B C D E
7.28	Other:_____	1 2 3 4 5	A B C D E
8.0	**MECHANICAL**		
8.1	Repair or replace engine	1 2 3 4 5	A B C D E
8.2	Repair or replace oil pan and pumps	1 2 3 4 5	A B C D E
8.3	Replace water pump	1 2 3 4 5	A B C D E
8.4	Replace engine mount	1 2 3 4 5	A B C D E
8.5	Repair or replace radiator	1 2 3 4 5	A B C D E
8.6	Replace or adjust belts	1 2 3 4 5	A B C D E
8.7	Replace harmonic balancer	1 2 3 4 5	A B C D E
8.8	Repair or replace brakes	1 2 3 4 5	A B C D E
8.9	Repair or replace steering column	1 2 3 4 5	A B C D E
8.10	Repair or replace power steering	1 2 3 4 5	A B C D E
8.11	Repair or replace timing gear and covers	1 2 3 4 5	A B C D E
8.12	Repair or replace exhaust system	1 2 3 4 5	A B C D E
8.13	Repair or replace drive line components	1 2 3 4 5	A B C D E
8.14	Diagnose and perform front end alignment	1 2 3 4 5	A B C D E
8.15	Mount and balance tires	1 2 3 4 5	A B C D E
8.16	Charge and test air conditioning units	1 2 3 4 5	A B C D E
8.17	Repair or replace air conditioning components	1 2 3 4 5	A B C D E
8.18	Other:_____	1 2 3 4 5	A B C D E
9.0	**ELECTRICAL**		
9.1	Apply electron theory - Ohm's Law	1 2 3 4 5	A B C D E
9.2	Read circuit symbols	1 2 3 4 5	A B C D E

No.	Item	Frequency	Importance
9.3	Identify component functions	1 2 3 4 5	A B C D E
9.4	Identify socket design	1 2 3 4 5	A B C D E
9.5	Interpret systematic diagrams	1 2 3 4 5	A B C D E
9.6	Perform operational inspection	1 2 3 4 5	A B C D E
9.7	Troubleshout and diagnose problems using testing equipment	1 2 3 4 5	A B C D E
9.9	Service and replace electrical motors	1 2 3 4 5	A B C D E
9.10	Service and replace exterior and accessory lights and switches	1 2 3 4 5	A B C D E
9.11	Service and replace fiber optics	1 2 3 4 5	A B C D E
9.12	Service and replace horns and buzzer warning systems	1 2 3 4 5	A B C D E
9.13	Service and replace instrument panel lights and gauges	1 2 3 4 5	A B C D E
9.14	Service and replace air conditioner electrical components	1 2 3 4 5	A B C D E
9.15	Service and replace electric operated sunroof	1 2 3 4 5	A B C D E
9.16	Service and replace cruise control	1 2 3 4 5	A B C D E
9.17	Service and replace radio	1 2 3 4 5	A B C D E
9.18	Service and replace power antenna	1 2 3 4 5	A B C D E
9.19	Service and replace rear window defogger	1 2 3 4 5	A B C D E
9.20	Service and replace power seats	1 2 3 4 5	A B C D E
9.21	Service and replace seat-belt starter interlock system	1 2 3 4 5	A B C D E
9.22	Other:_____	1 2 3 4 5	A B C D E
10.0	HANDTOOLS		
10.1	Select and use body hammers	1 2 3 4 5	A B C D E
10.2	Select and use dolly blocks	1 2 3 4 5	A B C D E
10.3	Select and use spoons	1 2 3 4 5	A B C D E
10.4	Select and use fender files	1 2 3 4 5	A B C D E

No.	Item	Frequency	Importance
10.5	Select and use pick tools and pry bars	1 2 3 4 5	A B C D E
10.6	Use vise-grip pliers	1 2 3 4 5	A B C D E
10.7	Select and use torque wrenches	1 2 3 4 5	A B C D E
10.8	Select and use hand wrenches	1 2 3 4 5	A B C D E
10.9	Select and use proper impact wrenches	1 2 3 4 5	A B C D E
10.10	Other:_____	1 2 3 4 5	A B C D E
11.0	**MATHEMATICS, COMMUNICATIONS AND HUMAN RELATION SKILLS**		
11.1	Add, subtract, multiply and divide whole numbers and decimals	1 2 3 4 5	A B C D E
11.2	Perform mental arithmetic to verify validity of calculator resolved problems	1 2 3 4 5	A B C D E
11.3	Interchange ratios, fractions, proportions, and decimals	1 2 3 4 5	A B C D E
11.4	Calculate percentages	1 2 3 4 5	A B C D E
11.5	Measure with correct precision	1 2 3 4 5	A B C D E
11.6	Perform simple angular (degrees) measurement	1 2 3 4 5	A B C D E
11.7	Perform simple geometry as applied to measurement	1 2 3 4 5	A B C D E
11.10	Use correct grammar when speaking and writing	1 2 3 4 5	A B C D E
11.11	Demonstrate effective telephone communication	1 2 3 4 5	A B C D E
11.12	Establish rapport with co-workers and customers	1 2 3 4 5	A B C D E
11.13	Read and interpret service manuals	1 2 3 4 5	A B C D E
11.14	Compose a simple letter	1 2 3 4 5	A B C D E
11.15	Prepare estimate sheet	1 2 3 4 5	A B C D E
11.16	Prepare a parts purchase order	1 2 3 4 5	A B C D E
11.17	Prepare a customer billing	1 2 3 4 5	A B C D E
11.18	Other:_____	1 2 3 4 5	A B C D E

APPENDIX B

RANK ORDER OF ENTRY-LEVEL AUTO BODY TASKS BY IMPORTANCE

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
11.10	Establish rapport with co-workers and customers	1.38
7.5	Use proper metal conditioning methods	1.57
7.4	Perform proper clean-up before painting	1.60
7.6	Properly prime prepared surfaces	1.62
2.1	Straighten fenders, doors, quarter and rocker panels	1.62
7.15	Apply acrylic lacquer paint	1.67
10.9	Select and use proper impact wrenches	1.67
7.9	Properly operate a spray gun in paint application processes	1.67
7.8	Mask area in preparation for painting	1.68
2.19	Use power sanding tools and equipment	1.70
7.1	Prepare surface for paint using a DA type sander	1.70
2.2	Straighten hoods, trunk lids and roofs	1.72
7.10	Clean and care for spray gun	1.72
2.18	Use hand sanding tools	1.73
7.3	Choose and apply proper abrasives for finishing operations	1.76
11.8	Use correct grammar when speaking and writing	1.76

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
2.14	Properly mix plastic fillers	1.77
2.15	Properly apply plastic fillers to damaged areas	1.77
7.16	Apply acrylic enamel paint	1.77
4.4	Align and adjust door hinges and strikers	1.77
4.2	Align and adjust body sheet metal	1.79
2.16	Properly shape plastic fillers to contour of the area being repaired	1.80
2.17	Use hand forming tools	1.83
11.9	Demonstrate effective telephone communication	1.86
1.10	Shrink sheet metal using heat	1.86
11.5	Measure with correct precision	1.86
2.3	Know how to position and use pull rods	1.86
1.4	Weld using MIG method	1.86
7.7	Choose and use surface sealers	1.87
7.20	Apply clear coat paint system	1.87
10.8	Select and use hand wrenches	1.90
4.1	Repair and replace body sheet metal	1.93
10.2	Select and use dolly blocks	1.93
11.11	Read and interpret service manuals	1.93
7.24	Apply rubbing compounds	1.93
10.1	Select and use body hammers	1.97

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
2.9	Determine the type of frame damage	1.97
11.13	Prepare estimate sheet	1.97
10.3	Select and use spoons	2.00
10.6	Use vise-grip pliers	2.00
10.5	Select and use pick tools and pry bars	2.03
7.2	Prepare surface for paint using an oscillating sander	2.04
4.3	Replace door skin	2.07
5.1	Check opening dimensions and measurements	2.07
7.23	Apply vinyl lower body stone protection	2.10
1.1	Set-up and use oxyacetylene equipment to cut, braze and weld	2.17
7.21	Replace wood grain transfer	2.17
11.1	Add, subtract, multiply and divide whole numbers and decimals	2.21
4.8	Replace and install trim	2.21
2.8	Set-up and use porta-power	2.23
7.22	Apply striping tape	2.23
7.17	Apply urethane enamel paint	2.23
10.4	Select and use fender files	2.30

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
7.12	Clean and care for air regulator	2.30
2.12	Straighten a unitized body using a universal type system	2.34
2.5	Set-up and use stationary rack type of frame straightening equipment	2.37
7.11	Maintain operating condition of air compressor	2.40
5.7	Adjust glass for wind noise and leaks	2.41
5.8	Check for leaks	2.41
1.2	Set-up and use arc and resistance welding equipment	2.45
1.9	Cut metal using an impact hammer	2.47
11.15	Prepare a customer billing	2.48
1.8	Use a shears to cut metal	2.50
11.6	Perform simple angular (degrees) measurement	2.50
2.10	Use a frame gauge	2.53
4.7	Replace and align tailgates	2.53
6.1	Remove and replace door trim panels	2.53
5.6	Remove and install operative glass	2.54
4.9	Replace and install weatherstripping	2.57
3.2	Prepare resin and fiberglass filler material	2.59

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
2.11	Straighten a unitized body using a dedicated bench type system	2.61
7.26	Apply rustproofing	2.61
3.1	Repair damaged fiderglass panel	2.62
6.2	Remove and replace dash and components	2.63
7.13	Clean and care for spray booth	2.63
4.5	Repair or replace outside door handle	2.67
3.5	Fill and finish fiberglass repairs	2.69
2.6	Set-up and use portable (dozer) type of frame straightening equipment	2.69
8.5	Repair or replace radiator	2.69
11.14	Prepare a parts purchase order	2.72
3.4	Join and patch fiberglass	2.72
3.3	Reinforce fiberglass components	2.72
11.2	Perform mental arithmetic to verify validity of calculator resolved problems	2.72
4.6	Replace and install door lock	2.73
6.3	Remove and install interior molding	2.73
2.7	Set-up and use rail or floor type of frame straightening equipment	2.76
5.5	Remove and install stationary glass	2.76

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
10.7	Select and use torque wrenches	2.79
5.3	Replace windshield using bonded system	2.86
5.4	Replace windshield using butyl tape	2.89
5.2	Replace windshield using rubber set	2.89
8.14	Diagnose and perform front end alignment	2.89
11.12	Compose a simple letter	2.90
9.9	Service and replace exterior and accessory lights and switches	2.93
7.25	Apply polish and wax	2.93
6.10	Clean interior	2.93
9.7	Troubleshoot and diagnose problems using testing equipment	2.93
11.7	Perform simple geometry as applied to measurement	2.97
9.6	Perform operational inspection	3.00
8.9	Repair or replace steering column	3.00
7.27	Apply soundproofing	3.03
8.13	Repair or replace drive line components	3.07
6.4	Replace headliners	3.07
11.4	Calculate percentages	3.10
9.17	Service and replace power antenna	3.10

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
1.6	Cut metal with an abrasive wheel	3.10
8.10	Repair or replace power steering	3.10
8.6	Replace or adjust belts	3.13
11.3	Interchange ratios, fractions, proportions, and decimals	3.14
8.15	Mount and balance tires	3.14
6.6	Replace and install seats and seat tracks	3.17
9.2	Read circuit symbols	3.21
8.17	Repair or replace air conditioning components	3.21
8.4	Replace engine mount	3.23
8.8	Repair or replace brakes	3.23
7.18	Apply water base acrylic paint	3.24
9.11	Service and replace horns and buzzer warning systems	3.27
7.19	Apply synthetic enamel paint	3.28
9.5	Interpret systematic diagrams	3.30
8.3	Replace water pump	3.36
9.3	Identify component functions	3.37
8.16	Charge and test air conditioning units	3.39
9.1	Apply electron theory - Ohm's Law	3.40

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
9.12	Service and replace instrument panel lights and gauges	3.43
8.12	Repair or replace exhaust system	3.47
7.14	Use air brush	3.48
9.18	Service and replace rear window defogger	3.48
2.4	Straighten bumpers	3.50
1.5	Perform plastic welding	3.50
1.7	Use a power jigsaw to cut metal	3.53
8.11	Repair or replace timing gear and covers	3.53
8.7	Replace harmonic balancer	3.55
2.13	Solder using tin-lead mixture	3.57
6.5	Remove and install sunroof panels	3.57
9.19	Service and replace power seats	3.57
9.4	Identify socket design	3.57
9.16	Service and replace radio	3.60
9.10	Service and replace fiber optics	3.60
9.15	Service and replace cruise control	3.62
9.13	Service and replace air conditioner electrical components	3.62

(Continued)

Rank Order of Entry-Level Auto
Auto Tasks by Importance

Item No.	Item	Mean
9.8	Service and replace electrical motors	3.63
6.9	Repair or replace carpeting	3.68
9.14	Service and replace electric operated sunroof	3.73
9.20	Service and replace seat-belt starter interlock system	3.75
8.1	Repair or replace engine	3.93
8.2	Repair or replace oil pan and pumps	3.93
6.7	Repair fabric upholstery	3.96
1.3	Weld aluminum	4.00
6.8	Repair vinyl upholstery	4.14

APPENDIX C

RANK ORDER OF ENTRY-LEVEL AUTO BODY TASKS BY FREQUENCY PERFORMED

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
11.10	Establish rapport with co-workers and customers	1.33
7.8	Mask area in preparation for painting	1.60
11.8	Use correct grammar when speaking and writing	1.63
7.6	Properly prime prepared surfaces	1.67
2.19	Use power sanding tools and equipment	1.67
11.9	Demonstrate effective telephone communication	1.7
7.3	Choose and apply proper abrasives for finishing operations	1.70
7.4	Perform proper clean-up before painting	1.70
7.24	Apply rubbing compounds	1.70
10.8	Select and use hand wrenches	1.71
7.5	Use proper metal conditioning methods	1.73
7.1	Prepare surface for paint using a DA type sander	1.74
10.1	Select and use body hammers	1.77
2.18	Use hand sanding tools	1.80
2.17	Use hand forming tools	1.80
7.9	Properly operate a spray gun in paint application processes	1.80

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
10.9	Select and use proper impact wrenches	1.80
2.16	Properly shape plastic fillers to contour of the area being repaired	1.83
2.15	Properly apply plastic fillers to damaged areas	1.83
2.14	Properly mix plastic fillers	1.83
2.1	Straighten fenders, doors, quarter and rocker panels	1.86
7.10	Clean and care for spray gun	1.86
10.2	Select and use dolly blocks	1.93
10.6	Use vise-grip pliers	1.93
7.7	Choose and use surface sealers	1.97
4.1	Repair and replace body sheet metal	1.97
7.15	Apply acrylic lacquer paint	2.00
4.2	Align and adjust body sheet metal	2.00
2.2	Straighten hoods, trunk lids and roofs	2.03
7.16	Apply acrylic enamel paint	2.03
10.5	Select and use pick tools and pry bars	2.07
11.11	Read and interpret service manuals	2.07
2.3	Know how to position and use pull rods	2.07
4.4	Align and adjust door hinges and strikers	2.10

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
7.2	Prepare surface for paint using an oscillating sander	2.11
10.3	Select and use spoons	2.13
11.1	Add, subtract, multiply and divide whole numbers and decimals	2.20
1.1	Set-up and use oxyacetylene equipment to cut, braze and weld	2.2
1.4	Weld using MIG method	2.27
4.8	Replace and install trim	2.31
11.5	Measure with correct precision	2.33
7.12	Clean and care for air regulator	2.37
11.13	Prepare estimate sheet	2.37
10.4	Select and use fender files	2.42
1.9	Cut metal using an impact hammer	2.47
7.22	Apply striping tape	2.47
2.8	Set-up and use porta-power	2.53
11.2	Perform mental arithmetic to verify validity of calculator resolved problems	2.57
6.1	Remove and replace door trim panels	2.58
1.2	Set-up and use arc and resistance welding equipment	2.60
7.20	Apply clear coat paint system	2.60

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
7.13	Clean and care for spray booth	2.60
2.9	Determine the type of frame damage	2.63
7.17	Apply urethane enamel paint	2.67
1.10	Shrink sheet metal using heat	2.70
4.3	Replace door skin	2.70
7.26	Apply rustproofing	2.70
7.23	Apply vinyl lower body stone protection	2.73
1.8	Use a shears to cut metal	2.77
4.6	Replace and install door lock	2.77
11.15	Prepare a customer billing	2.77
7.11	Maintain operating condition of air compressor	2.79
6.10	Clean interior	2.80
4.5	Repair or replace outside door handle	2.80
4.9	Replace and install weatherstripping	2.80
7.25	Apply polish and wax	2.84
5.6	Remove and install operative glass	2.86
5.1	Check opening dimensions and measurements	2.86
5.8	Check for leaks	2.90
2.12	Straighten a unitized body using a universal type system	2.90

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
5.7	Adjust glass for wind noise and leaks	2.93
2.10	Use a frame gauge	2.93
3.5	Fill and finish fiberglass repairs	3.00
3.1	Repair damaged fiderglass panel	3.03
11.6	Perform simple angular (degrees) measurement	3.03
3.2	Prepare resin and fiberglass filler material	3.07
4.7	Replace and align tailgates	3.13
5.5	Remove and install stationary glass	3.14
1.6	Cut metal with an abrasive wheel	3.14
11.4	Calculate percentages	3.17
11.14	Prepare a parts purchase order	3.17
3.3	Reinforce fiberglass components	3.17
8.5	Repair or replace radiator	3.17
6.3	Remove and install interior molding	3.17
7.27	Apply soundproofing	3.17
2.5	Set-up and use stationary rack type of frame straightening equipment	3.20
3.4	Join and patch fiberglass	3.25
2.7	Set-up and use rail or floor type of frame straightening equipment	3.27

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
9.9	Service and replace exterior and accessory lights and switches	3.27
11.3	Interchange ratios, fractions, proportions, and decimals	3.28
8.6	Replace or adjust belts	3.30
9.6	Perform operational inspection	3.31
7.21	Replace wood grain transfer	3.33
2.6	Set-up and use portable (dozer) type of frame straightening equipment	3.38
11.12	Compose a simple letter	3.40
1.7	Use a power jigsaw to cut metal	3.40
9.7	Troubleshoot and diagnose problems using testing equipment	3.40
11.7	Perform simple geometry as applied to measurement	3.43
10.7	Select and use torque wrenches	3.48
5.3	Replace windshield using bonded system	3.48
9.11	Service and replace horns and buzzer warning systems	3.48
2.4	Straighten bumpers	3.50
5.4	Replace windshield using butyl tape	3.52
5.2	Replace windshield using rubber set	3.52
8.14	Diagnose and perform front end alignment	3.52

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
6.6	Replace and install seats and seat tracks	3.53
9.17	Service and replace power antenna	3.57
8.15	Mount and balance tires	3.63
6.2	Remove and replace dash and components	3.66
9.16	Service and replace radio	3.67
8.13	Repair or replace drive line components	3.70
8.4	Replace engine mount	3.73
2.11	Straighten a unitized body using a dedicated bench type system	3.76
9.8	Service and replace electrical motors	3.77
9.3	Identify component functions	3.77
8.8	Repair or replace brakes	3.77
9.4	Identify socket design	3.77
8.10	Repair or replace power steering	3.77
8.3	Replace water pump	3.79
8.9	Repair or replace steering column	3.80
1.5	Perform plastic welding	3.83
8.17	Repair or replace air conditioning components	3.83
9.1	Apply electron theory - Ohm's Law	3.83

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
9.12	Service and replace instrument panel lights and gauges	3.83
9.2	Read circuit symbols	3.86
8.12	Repair or replace exhaust system	3.87
9.5	Interpret systematic diagrams	3.90
8.16	Charge and test air conditioning units	3.90
2.13	Solder using tin-lead mixture	3.93
7.14	Use air brush	3.97
9.10	Service and replace fiber optics	3.97
8.7	Replace harmonic balancer	3.97
9.15	Service and replace cruise control	4.00
6.4	Replace headliners	4.00
9.13	Service and replace air conditioner electrical components	4.03
7.19	Apply synthetic enamel paint	4.07
9.18	Service and replace rear window defogger	4.07
9.19	Service and replace power seats	4.10
6.9	Repair or replace carpeting	4.13
8.11	Repair or replace timing gear and covers	4.17

(Continued)

Rank Order of Entry-Level Auto Body
Tasks by Frequency Performed

Item No.	Item	Mean
8.2	Repair or replace oil pan and pumps	4.20
7.18	Apply water base acrylic paint	4.23
8.1	Repair or replace engine	4.23
6.5	Remove and install sunroof panels	4.24
9.20	Service and replace seat-belt starter interlock system	4.30
9.14	Service and replace electric operated sunroof	4.30
1.3	Weld aluminum	4.40
6.7	Repair fabric upholstery	4.50
6.8	Repair vinyl upholstery	4.59

APPENDIX D

RANK DIFFERENCE OF ENTRY-LEVEL AUTO BODY TASKS

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
11.10	Establish rapport with co-workers and customers	1	1	0
7.5	Use proper metal conditioning methods	2	11	- 9
7.4	Perform proper clean-up before painting	3.	7.5	- 4.5
7.6	Properly prime prepared surfaces	4.5	4.5	0
2.1	Straighten fenders, doors, quarter and rocker panels	4.5	21.5	-17
7.15	Apply acrylic lacquer paint	7	27.5	-20.5
10.9	Select and use proper impact wrenches	7	15.5	- 8.5
7.9	Properly operate a spray gun in paint application processes	7	15.5	- 8.5
7.8	Mask area in preparation for painting	9	2	+ 7
2.19	Use power sanding tools and equipment	10.5	4.5	+ 6
7.1	Prepare surface for paint using a DA type sander	10.5	12	- 1.5
2.2	Straighten hoods, trunk lids and roofs	12.5	29.5	-17

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
7.10	Clean and care for spray gun	12.5	21.5	- 9
2.18	Use hand sanding tools	14	15.5	- 1.5
7.3	Choose and apply proper abrasives for finishing operations	15.5	7.5	+ 8
11.8	Use correct grammar when speaking and writing	15.5	3	+12.5
2.14	Properly mix plastic fillers	18.5	19	- 0.5
2.15	Properly apply plastic fillers to damaged areas	18.5	19	- 0.5
7.16	Apply acrylic enamel paint	18.5	4.5	+14
4.4	Align and adjust door hinges and strikers	18.5	34	-15.5
4.2	Align and adjust body sheet metal	21	27.5	- 6.5
2.16	Properly shape plastic fillers to contour of the area being repaired	22	19	+ 3
2.17	Use hand forming tools	23	15.5	+ 7.5
11.9	Demonstrate effective telephone communication	26	7.5	+18.5
1.10	Shrink sheet metal using heat	26	80	-54
11.5	Measure with correct precision	26	41	-15
7.7	Choose and use surface sealers	29.5	25.5	+ 4

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
2.3	Know how to position and use pull rods	26	32	- 6
1.4	Weld using MIG method	26	39	-13
7.20	Apply clear coat paint system	29.5	75	-45.5
10.8	Select and use hand wrenches	31	10	+21
4.1	Repair and replace body sheet metal	33.5	25.5	+ 8
10.2	Select and use dolly blocks	33.5	23.5	+10
11.11	Read and interpret service manuals	33.5	32	+ 1.5
7.24	Apply rubbing compounds	33.5	7.5	+26
10.1	Select and use body hammers	37	13	+24
2.9	Determine the type of frame damage	37	77	-40
11.13	Prepare estimate sheet	37	42.5	- 5.5
10.3	Select and use spoons	39.5	36	+ 3.5
10.6	Use vise-grip pliers	39.5	23.5	+16
10.5	Select and use pick tools and pry bars	41	32	+ 9
7.2	Prepare surface for paint using an oscillating sander	42	35	+ 7

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
4.3	Replace door skin	43.5	80	-36.5
5.1	Check opening dimensions and measurements	43.5	91.5	-48
7.23	Apply vinyl lower body stone protection	45	82	-37
1.1	Set-up and use oxyacetylene equipment to cut, braze and weld	46.5	37.5	+ 9
7.21	Replace wood grain transfer	46.5	63	-16.5
11.1	Add, subtract, multiply and divide whole numbers and decimals	48.5	37.5	+11
4.8	Replace and install trim	48.5	40	+ 8.5
2.8	Set-up and use porta-power	51	47	+ 4
7.22	Apply striping tape	51	45.5	+ 5.5
7.17	Apply urethane enamel paint	51	78	-27
10.4	Select and use fender files	53.5	44	+ 9.5
7.12	Clean and care for air regulator	53.5	42.5	+11
2.12	Straighten a unitized body using a universal type system	55	93.5	-38.5
2.5	Set-up and use stationary rack type of frame straightening equipment	56	56	0
7.11	Maintain operating condition of air compressor	57	86	-29

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
5.7	Adjust glass for wind noise and leaks	58.5	95.5	-37
5.8	Check for leaks	58.5	93.5	-35
1.2	Set-up and use arc and resistance welding equipment	60	75	-15
1.9	Cut metal using an impact hammer	61	45.5	+15.5
11.15	Prepare a customer billing	62	84	-22
1.8	Use a shears to cut metal	63.5	84	-20.5
11.6	Perform simple angular (degrees) measurement	63.5	98.5	-35
2.10	Use a frame gauge	66	95.5	-29.5
4.7	Replace and align tailgates	66	101	-35
6.1	Remove and replace door trim panels	66	73	- 7
5.6	Remove and install operative glass	68	91.5	-23.5
4.9	Replace and install weatherstripping	69	88	-19
3.2	Prepare resin and fiberglass filler material	70	100	-30
2.11	Straighten a unitized body using a dedicated bench type system	71.5	113	-41.5
7.26	Apply rustproofing	71.5	80	- 8.5

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
3.1	Repair damaged fiderglass panel	73	98.5	-25.5
6.2	Remove and replace dash and components	74.5	109	-34.5
7.13	Clean and care for spray booth	74.5	75	- 0.5
4.5	Repair or replace outside door handle	76	88	-12
3.5	Fill and finish fiberglass repairs	78	97	-19
2.6	Set-up and use portable (dozer) type of frame straightening equipment	78	64	+14
8.5	Repair or replace radiator	78	52.5	+25.5
11.14	Prepare a parts purchase order	81.5	52.5	+29
3.4	Join and patch fiberglass	81.5	57	+24.5
3.3	Reinforce fiberglass components	81.5	52.5	+29
11.2	Perform mental arithmetic to verify validity of calculator resolved problems	81.5	48	+33.5
4.6	Replace and install door lock	84.5	84	+ 0.5
6.3	Remove and install interior molding	84.5	52.5	+32
2.7	Set-up and use rail or floor type of frame straightening equipment	86.5	58.5	+28

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
5.5	Remove and install stationary glass	86.5	102	-15.5
10.7	Select and use torque wrenches	88	70	+18
5.3	Replace windshield using bonded system	89	70	+19
5.4	Replace windshield using butyl tape	91	104	-13
5.2	Replace windshield using rubber set	91	104	-13
8.14	Diagnose and perform front end alignment	91	104	-13
11.12	Compose a simple letter	93	66	+27
9.9	Service and replace exterior and accessory lights and switches	95.5	58.5	+37
7.25	Apply polish and wax	95.5	90	+ 5.5
6.10	Clean interior	95.5	88	+7.5
9.7	Troubleshoot and diagnose problems using testing equipment	95.5	66	+29.5
11.7	Perform simple geometry as applied to measurement	98	68	+30
9.6	Perform operational inspection	99.5	62	+37.5
8.9	Repair or replace steering column	99.5	120	-20.5
7.27	Apply soundproofing	101	52.5	+48.5

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
8.13	Repair or replace drive line components	102.5	111	- 8.5
6.4	Replace headliners	102.5	133.5	-31
11.4	Calculate percentages	105.5	52.5	+53
9.17	Service and replace power antenna	105.5	107	- 1.5
1.6	Cut metal with an abrasive wheel	105.5	49	+56.5
8.10	Repair or replace power steering	105.5	116	-10.5
8.6	Replace or adjust belts	108	61	+47
11.3	Interchange ratios, fractions, proportions, and decimals	109.5	60	+49.5
8.15	Mount and balance tires	105.5	108	- 2.5
6.6	Replace and install seats and seat tracks	111	106	+ 5
9.2	Read circuit symbols	112.5	125	-12.5
8.17	Repair or replace air conditioning components	112.5	122.5	-10
8.4	Replace engine mount	114.5	112	+ 2.5
8.8	Repair or replace brakes	114.5	116	- 1.5
7.18	Apply water base acrylic paint	116	142.5	-26.5
9.11	Service and replace horns and buzzer warning systems	117	70	+47

(Continued)

Rank Difference of Entry-Level
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
7.19	Apply synthetic enamel paint	118	136.5	-18.5
9.5	Interpret systematic diagrams	119	127.5	- 8.5
8.3	Replace water pump	120	119	+ 1
9.3	Identify component functions	121	116	+ 5
8.16	Charge and test air conditioning units	122	127.5	- 5.5
9.1	Apply electron theory - Ohm's Law	123	122.5	+ 0.5
9.12	Service and replace instrument panel lights and gauges	124	122.5	+ 1.5
8.12	Repair or replace exhaust system	125	126	- 1
7.14	Use air brush	126.5	130	- 3.5
9.18	Service and replace rear window defogger	126.5	136.5	-10
2.4	Straighten bumpers	128.5	72	+56.5
1.5	Perform plastic welding	128.5	122.5	+ 6
1.7	Use a power jigsaw to cut metal	130.5	66	+64.5
8.11	Repair or replace timing gear and covers	130.5	140	- 9.5
8.7	Replace harmonic balancer	132	131.5	+ 0.5
2.13	Solder using tin-lead mixture	134.5	129	+ 5.5

APPENDIX D (Continued)

Rank Difference of **Entry-Level**
Auto Body Tasks

Item No.	Item	Impt. Rank	Freq. Rank	Diff. in Rank
6.5	Remove and install sunroof panels	134.5	144	- 9.5
9.19	Service and replace power seats	134.5	138	- 3.5
9.4	Identify socket design	134.5	116	+18.5
9.16	Service and replace radio	137.5	110	+27.5
9.10	Service and replace fiber optics	137.5	131.5	+ 6
9.15	Service and replace cruise control	139.5	133.5	+ 6
9.13	Service and replace air conditioner electrical components	139.5	135	+ 4.5
9.8	Service and replace electrical motors	141	116	+25
6.9	Repair or replace carpeting	142	139	+ 3
9.14	Service and replace electric operated sunroof	143	145.5	- 2.5
9.20	Service and replace seat-belt starter interlock system	144	145.5	- 1.5
8.1	Repair or replace engine	145.5	142.5	+ 3
8.2	Repair or replace oil pan and pumps	145.5	141	+ 4.5
6.7	Repair fabric upholstery	147	148	- 1
1.3	Weld aluminum	148	147	+ 1
6.8	Repair vinyl upholstery	149	149	0

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